

## SEQUENCE LISTING

<110> Oppermann, Hermann  
 Tai, Mei-Sheng  
 McCartney, John

<120> Modified TGF-beta Superfamily Proteins

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<170> PatentIn Ver. 2.0

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 Arg Ser Leu Arg Ala Ala Ala Pro His Ser Phe Val Ala Leu Trp Ala  
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ccc ctg ttc ctg ctg cgc tcc gcc ctg gcc gac ttc agc ctg gac aac 153  
 Pro Leu Phe Leu Leu Arg Ser Ala Leu Ala Asp Phe Ser Leu Asp Asn  
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cgg gag atg cag cgc gag atc ctc tcc att ttg ggc ttg ccc cac cgc 249  
 Arg Glu Met Gln Arg Glu Ile Leu Ser Ile Leu Gly Leu Pro His Arg  
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Pro	Arg	Pro	His	Leu	Gln	Gly	Lys	His	Asn	Ser	Ala	Pro	Met	Phe	Met	
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ctg	gac	ctg	tac	aac	gcc	atg	gcg	gtg	gag	gag	ggc	ggc	ggg	ccc	ggc	345
Leu	Asp	Leu	Tyr	Asn	Ala	Met	Ala	Val	Glu	Glu	Gly	Gly	Gly	Pro	Gly	
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ggc	cag	ggc	ttc	tcc	tac	ccc	tac	aag	gcc	gtc	ttc	agt	acc	cag	ggc	393
Gly	Gln	Gly	Phe	Ser	Tyr	Pro	Tyr	Lys	Ala	Val	Phe	Ser	Thr	Gln	Gly	
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ccc	cct	ctg	gcc	agc	ctg	caa	gat	agc	cat	ttc	ctc	acc	gac	gcc	gac	441
Pro	Pro	Leu	Ala	Ser	Leu	Gln	Asp	Ser	His	Phe	Leu	Thr	Asp	Ala	Asp	
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atg	gtc	atg	agc	ttc	gtc	aac	ctc	gtg	gaa	cat	gac	aag	gaa	ttc	ttc	489
Met	Val	Met	Ser	Phe	Val	Asn	Leu	Val	Glu	His	Asp	Lys	Glu	Phe	Phe	
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cac	cca	cgc	tac	cac	cat	cga	gag	ttc	cgg	ttt	gat	ctt	tcc	aag	atc	537
His	Pro	Arg	Tyr	His	His	Arg	Glu	Phe	Arg	Phe	Asp	Leu	Ser	Lys	Ile	
		150														
cca	gaa	ggg	gaa	gct	gtc	acg	gca	gcc	gaa	ttc	cgg	atc	tac	aag	gac	585
Pro	Glu	Gly	Glu	Ala	Val	Thr	Ala	Ala	Glu	Phe	Arg	Ile	Tyr	Lys	Asp	
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tac	atc	cgg	gaa	cgc	ttc	gac	aat	gag	acg	ttc	cgg	atc	agc	gtt	tat	633
Tyr	Ile	Arg	Glu	Arg	Phe	Asp	Asn	Glu	Thr	Phe	Arg	Ile	Ser	Val	Tyr	
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cag	gtg	ctc	cag	gag	cac	ttg	ggc	agg	gaa	tcg	gat	ctc	ttc	ctg	ctc	681
Gln	Val	Leu	Gln	Glu	His	Leu	Gly	Arg	Glu	Ser	Asp	Leu	Phe	Leu	Leu	
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gac	agc	cgt	acc	ctc	tgg	gcc	tcg	gag	gag	ggc	tgg	ctg	gtg	ttt	gac	729
Asp	Ser	Arg	Thr	Leu	Trp	Ala	Ser	Glu	Glu	Gly	Trp	Leu	Val	Phe	Asp	
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atc	aca	gcc	acc	agc	aac	cac	tgg	gtg	gtc	aat	ccg	cgg	cac	aac	ctg	777
Ile	Thr	Ala	Thr	Ser	Asn	His	Trp	Val	Val	Asn	Pro	Arg	His	Asn	Leu	
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ggc	ctg	cag	ctc	tcg	gtg	gag	acg	ctg	gat	ggg	cag	agc	atc	aac	ccc	825
Gly	Leu	Gln	Leu	Ser	Val	Glu	Thr	Leu	Asp	Gly	Gln	Ser	Ile	Asn	Pro	
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aag	ttg	gcg	ggc	ctg	att	ggg	cgg	cac	ggg	ccc	cag	aac	aag	cag	ccc	873
Lys	Leu	Ala	Gly	Leu	Ile	Gly	Arg	His	Gly	Pro	Gln	Asn	Lys	Gln	Pro	
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ttc	atg	gtg	gct	ttc	ttc	aag	gcc	acg	gag	gtc	cac	ttc	cgc	agc	atc	921
Phe	Met	Val	Ala	Phe	Phe	Lys	Ala	Thr	Glu	Val	His	Phe	Arg	Ser	Ile	

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 Arg Ser Thr Gly Ser Lys Gln Arg Ser Gln Asn Arg Ser Lys Thr Pro  
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 Lys Asn Gln Glu Ala Leu Arg Met Ala Asn Val Ala Glu Asn Ser Ser  
 310 315 320  
  
 agc gac cag agg cag gcc tgt aag aag cac gag ctg tat gtc agc ttc 1065  
 Ser Asp Gln Arg Gln Ala Cys Lys Lys His Glu Leu Tyr Val Ser Phe  
 325 330 335  
  
 cga gac ctg ggc tgg cag gac tgg atc atc gcg cct gaa ggc tac gcc 1113  
 Arg Asp Leu Gly Trp Gln Asp Trp Ile Ile Ala Pro Glu Gly Tyr Ala  
 340 345 350 355  
  
 gcc tac tac tgt gag ggg gag tgt gcc ttc cct ctg aac tcc tac atg 1161  
 Ala Tyr Tyr Cys Glu Gly Glu Cys Ala Phe Pro Leu Asn Ser Tyr Met  
 360 365 370  
  
 aac gcc acc aac cac gcc atc gtg cag acg ctg gtc cac ttc atc aac 1209  
 Asn Ala Thr Asn His Ala Ile Val Gln Thr Leu Val His Phe Ile Asn  
 375 380 385  
  
 ccg gaa acg gtg ccc aag ccc tgc tgt gcg ccc acg cag ctc aat gcc 1257  
 Pro Glu Thr Val Pro Lys Pro Cys Cys Ala Pro Thr Gln Leu Asn Ala  
 390 395 400  
  
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 Ile Ser Val Leu Tyr Phe Asp Asp Ser Ser Asn Val Ile Leu Lys Lys  
 405 410 415  
  
 tac aga aac atg gtg gtc cgg gcc tgt ggc tgc cac tagctcctcc 1351  
 Tyr Arg Asn Met Val Val Arg Ala Cys Gly Cys His  
 420 425 430  
  
 gagaattcag accctttggg gccaaagtttt tctggatcct ccattgctcg ccttggccag 1411  
 gaaccagcag accaactgcc ttttgtgaga ccttcccctc cctatcccca actttaaagg 1471  
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<210> 39  
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[illegible][illegible]



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 Asn Ser Ser Ser Asp Gln Arg Gln Ala Cys Lys Lys His Glu Leu Tyr  
                     325                      330                      335  
 Val Ser Phe Arg Asp Leu Gly Trp Gln Asp Trp Ile Ile Ala Pro Glu  
                     340                      345                      350  
 Gly Tyr Ala Ala Tyr Tyr Cys Glu Gly Glu Cys Ala Phe Pro Leu Asn  
                     355                      360                      365  
 Ser Tyr Met Asn Ala Thr Asn His Ala Ile Val Gln Thr Leu Val His  
                     370                      375                      380  
 Phe Ile Asn Pro Glu Thr Val Pro Lys Pro Cys Cys Ala Pro Thr Gln  
 385                      390                      395                      400  
 Leu Asn Ala Ile Ser Val Leu Tyr Phe Asp Asp Ser Ser Asn Val Ile  
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 Leu Lys Lys Tyr Arg Asn Met Val Val Arg Ala Cys Gly Cys His  
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                     20                      25                      30  
 Pro Cys Pro Tyr Ile Trp Ser Leu Asp Thr Gln Tyr Ser Lys Val Leu  
                     35                      40                      45  
 Ala Leu Tyr Asn Gln His Asn Pro Gly Ala Ser Ala Ala Pro Cys Cys  
                     50                      55                      60  
 Val Pro Gln Ala Leu Glu Pro Leu Pro Ile Val Tyr Tyr Val Gly Arg  
                     65                      70                      75                      80  
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<210> 41  
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<220>  
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 Ala Cys Pro Tyr Leu Trp Ser Ser Asp Thr Gln His Ser Arg Val Leu  
 35 40 45  
 Ser Leu Tyr Asn Thr Ile Asn Pro Glu Ala Ser Ala Ser Pro Cys Cys  
 50 55 60  
 Val Ser Gln Asp Leu Glu Pro Leu Thr Ile Leu Tyr Tyr Ile Gly Lys  
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 85 90 95  
 Cys Ser

<210> 42  
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<220>  
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 Pro Cys Pro Tyr Leu Arg Ser Ala Asp Thr Thr His Ser Thr Val Leu  
 35 40 45  
 Gly Leu Tyr Asn Thr Leu Asn Pro Glu Ala Ser Ala Ser Pro Cys Cys  
 50 55 60  
 Val Pro Gln Asp Leu Glu Pro Leu Thr Ile Leu Tyr Tyr Val Gly Arg  
 65 70 75 80  
 Thr Pro Lys Val Glu Gln Leu Ser Asn Met Val Val Lys Ser Cys Lys

85

90

95

Cys Ser

<210> 43  
 <211> 98  
 <212> PRT  
 <213> Gallus gallus

<220>  
 <223> TGF-Beta4

<400> 43  
 Cys Cys Val Arg Pro Leu Tyr Ile Asp Phe Arg Lys Asp Leu Gln Trp  
   1                  5                  10                  15  
 Lys Trp Ile His Glu Pro Lys Gly Tyr Met Ala Asn Phe Cys Met Gly  
                   20                  25                  30  
 Pro Cys Pro Tyr Ile Trp Ser Ala Asp Thr Gln Tyr Thr Lys Val Leu  
                   35                  40                  45  
 Ala Leu Tyr Asn Gln His Asn Pro Gly Ala Ser Ala Ala Pro Cys Cys  
                   50                  55                  60  
 Val Pro Gln Thr Leu Asp Pro Leu Pro Ile Ile Tyr Tyr Val Gly Arg  
   65                  70                  75                  80  
 Asn Val Arg Val Glu Gln Leu Ser Asn Met Val Val Arg Ala Cys Lys  
                   85                  90                  95

Cys Ser

<210> 44  
 <211> 98  
 <212> PRT  
 <213> Xenopus laevis

<220>  
 <223> TGF-Beta5

<400> 44  
 Cys Cys Val Lys Pro Leu Tyr Ile Asn Phe Arg Lys Asp Leu Gly Trp  
   1                  5                  10                  15  
 Lys Trp Ile His Glu Pro Lys Gly Tyr Glu Ala Asn Tyr Cys Leu Gly  
                   20                  25                  30  
 Asn Cys Pro Tyr Ile Trp Ser Met Asp Thr Gln Tyr Ser Lys Val Leu  
                   35                  40                  45  
 Ser Leu Tyr Asn Gln Asn Asn Pro Gly Ala Ser Ile Ser Pro Cys Cys  
   50                  55                  60

Val Pro Asp Val Leu Glu Pro Leu Pro Ile Ile Tyr Tyr Val Gly Arg  
65 70 75 80

Thr Ala Lys Val Glu Gln Leu Ser Asn Met Val Val Arg Ser Cys Asn  
85 90 95

Cys Ser

<210> 45  
<211> 102  
<212> PRT  
<213> Drosophila melanogaster

<220>  
<223> DPP

<400> 45  
Cys Arg Arg His Ser Leu Tyr Val Asp Phe Ser Asp Val Gly Trp Asp  
1 5 10 15

Asp Trp Ile Val Ala Pro Leu Gly Tyr Asp Ala Tyr Tyr Cys His Gly  
20 25 30

Lys Cys Pro Phe Pro Leu Ala Asp His Phe Asn Ser Thr Asn His Ala  
35 40 45

Val Val Gln Thr Leu Val Asn Asn Met Asn Pro Gly Lys Val Pro Lys  
50 55 60

Ala Cys Cys Val Pro Thr Gln Leu Asp Ser Val Ala Met Leu Tyr Leu  
65 70 75 80

Asn Asp Gln Ser Thr Val Val Leu Lys Asn Tyr Gln Glu Met Thr Val  
85 90 95

Val Gly Cys Gly Cys Arg  
100

<210> 46  
<211> 102  
<212> PRT  
<213> Xenopus laevis

<220>  
<223> VG1

<400> 46  
Cys Lys Lys Arg His Leu Tyr Val Glu Phe Lys Asp Val Gly Trp Gln  
1 5 10 15

Asn Trp Val Ile Ala Pro Gln Gly Tyr Met Ala Asn Tyr Cys Tyr Gly  
20 25 30

Glu Cys Pro Tyr Pro Leu Thr Glu Ile Leu Asn Gly Ser Asn His Ala  
                   35                  40                  45  
 Ile Leu Gln Thr Leu Val His Ser Ile Glu Pro Glu Asp Ile Pro Leu  
           50                  55                  60  
 Pro Cys Cys Val Pro Thr Lys Met Ser Pro Ile Ser Met Leu Phe Tyr  
       65                  70                  75                  80  
 Asp Asn Asn Asp Asn Val Val Leu Arg His Tyr Glu Asn Met Ala Val  
                   85                  90                  95  
 Asp Glu Cys Gly Cys Arg  
           100

<210> 47  
 <211> 102  
 <212> PRT  
 <213> Mus musculus

<220>  
 <223> VGR1

<400> 47  
 Cys Lys Lys His Glu Leu Tyr Val Ser Phe Gln Asp Leu Gly Trp Gln  
       1                  5                  10                  15  
 Asp Trp Ile Ile Ala Pro Lys Gly Tyr Ala Ala Asn Tyr Cys Asp Gly  
           20                  25                  30  
 Glu Cys Ser Phe Pro Leu Asn Ala His Met Asn Ala Thr Asn His Ala  
           35                  40                  45  
 Ile Val Gln Thr Leu Val His Leu Met Asn Pro Glu Tyr Val Pro Lys  
           50                  55                  60  
 Pro Cys Cys Ala Pro Thr Lys Leu Asn Ala Ile Ser Val Leu Tyr Phe  
       65                  70                  75                  80  
 Asp Asp Asn Ser Asn Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val  
                   85                  90                  95  
 Arg Ala Cys Gly Cys His  
           100

<210> 48  
 <211> 118  
 <212> PRT  
 <213> Drosophila melanogaster

<220>  
 <223> 60A

<400> 48  
 Cys Gln Met Gln Thr Leu Tyr Ile Asp Phe Lys Asp Leu Gly Trp His

1	5	10	15
Asp Trp Ile Ile Ala Pro Glu Gly Tyr Gly Ala Phe Tyr Cys Ser Gly	20	25	30
Glu Cys Asn Phe Pro Leu Asn Ala His Met Asn Ala Thr Asn His Ala	35	40	45
Ile Val Gln Thr Leu Val His Leu Leu Glu Pro Lys Lys Val Pro Lys	50	55	60
Pro Cys Cys Ala Pro Thr Arg Leu Gly Ala Leu Pro Val Leu Tyr His	65	70	75
Pro Cys Cys Ala Pro Thr Arg Leu Gly Ala Leu Pro Val Leu Tyr His	85	90	95
Leu Asn Asp Glu Asn Val Asn Leu Lys Lys Tyr Arg Asn Met Ile Val	100	105	110
Lys Ser Cys Gly Cys His	115		

<210> 49  
 <211> 101  
 <212> PRT  
 <213> Homo sapiens

<220>  
 <223> BMP-2A

<400> 49
Cys Lys Arg His Pro Leu Tyr Val Asp Phe Ser Asp Val Gly Trp Asn
1 5 10 15
Asp Trp Ile Val Ala Pro Pro Gly Tyr His Ala Phe Tyr Cys His Gly
20 25 30
Glu Cys Pro Phe Pro Leu Ala Asp His Leu Asn Ser Thr Asn His Ala
35 40 45
Ile Val Gln Thr Leu Val Asn Ser Val Asn Ser Lys Ile Pro Lys Ala
50 55 60
Cys Cys Val Pro Thr Glu Leu Ser Ala Ile Ser Met Leu Tyr Leu Asp
65 70 75 80
Glu Asn Glu Lys Val Val Leu Lys Asn Tyr Gln Asp Met Val Val Glu
85 90 95
Gly Cys Gly Cys Arg
100

<210> 50  
 <211> 103

<212> PRT  
<213> Homo sapiens

<220>  
<223> BMP3

<400> 50  
Cys Ala Arg Arg Tyr Leu Lys Val Asp Phe Ala Asp Ile Gly Trp Ser  
1 5 10 15  
Glu Trp Ile Ile Ser Pro Lys Ser Phe Asp Ala Tyr Tyr Cys Ser Gly  
20 25 30  
Ala Cys Gln Phe Pro Met Pro Lys Ser Leu Lys Pro Ser Asn His Ala  
35 40 45  
Thr Ile Gln Ser Ile Val Arg Ala Val Gly Val Val Pro Gly Ile Pro  
50 55 60  
Glu Pro Cys Cys Val Pro Glu Lys Met Ser Ser Leu Ser Ile Leu Phe  
65 70 75 80  
Phe Asp Glu Asn Lys Asn Val Val Leu Lys Val Tyr Pro Asn Met Thr  
85 90 95  
Val Glu Ser Cys Ala Cys Arg  
100

<210> 51  
<211> 101  
<212> PRT  
<213> Homo sapiens

<220>  
<223> BMP-4

<400> 51  
Cys Arg Arg His Ser Leu Tyr Val Asp Phe Ser Asp Val Gly Trp Asn  
1 5 10 15  
Asp Trp Ile Val Ala Pro Pro Gly Tyr Gln Ala Phe Tyr Cys His Gly  
20 25 30  
Asp Cys Pro Phe Pro Leu Ala Asp His Leu Asn Ser Thr Asn His Ala  
35 40 45  
Ile Val Gln Thr Leu Val Asn Ser Val Asn Ser Ser Ile Pro Lys Ala  
50 55 60  
Cys Cys Val Pro Thr Glu Leu Ser Ala Ile Ser Met Leu Tyr Leu Asp  
65 70 75 80  
Glu Tyr Asp Lys Val Val Leu Lys Asn Tyr Gln Glu Met Val Val Glu  
85 90 95  
Gly Cys Gly Cys Arg

100

<210> 52  
<211> 102  
<212> PRT  
<213> Homo sapiens

<220>  
<223> BMP-5

<400> 52  
Cys Lys Lys His Glu Leu Tyr Val Ser Phe Arg Asp Leu Gly Trp Gln  
1 5 10 15  
Asp Trp Ile Ile Ala Pro Glu Gly Tyr Ala Ala Phe Tyr Cys Asp Gly  
20 25 30  
Glu Cys Ser Phe Pro Leu Asn Ala His Met Asn Ala Thr Asn His Ala  
35 40 45  
Ile Val Gln Thr Leu Val His Leu Met Phe Pro Asp His Val Pro Lys  
50 55 60  
Pro Cys Cys Ala Pro Thr Lys Leu Asn Ala Ile Ser Val Leu Tyr Phe  
65 70 75 80  
Asp Asp Ser Ser Asn Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val  
85 90 95  
Arg Ser Cys Gly Cys His  
100

<210> 53  
<211> 102  
<212> PRT  
<213> Homo sapiens

<220>  
<223> BMP-6

<400> 53  
Cys Arg Lys His Glu Leu Tyr Val Ser Phe Gln Asp Leu Gly Trp Gln  
1 5 10 15  
Asp Trp Ile Ile Ala Pro Lys Gly Tyr Ala Ala Asn Tyr Cys Asp Gly  
20 25 30  
Glu Cys Ser Phe Pro Leu Asn Ala His Met Asn Ala Thr Asn His Ala  
35 40 45  
Ile Val Gln Thr Leu Val His Leu Met Asn Pro Glu Tyr Val Pro Lys  
50 55 60  
Pro Cys Cys Ala Pro Thr Lys Leu Asn Ala Ile Ser Val Leu Tyr Phe  
65 70 75 80



Asp Asp Asn Ser Asn Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val  
85 90 95

Arg Ala Cys Gly Cys His  
100

<210> 54  
<211> 103  
<212> PRT  
<213> Gallus gallus

<220>  
<223> DORSALIN

<400> 54  
Cys Arg Arg Thr Ser Leu His Val Asn Phe Lys Glu Ile Gly Trp Asp  
1 5 10 15

Ser Trp Ile Ile Ala Pro Lys Asp Tyr Glu Ala Phe Glu Cys Lys Gly  
20 25 30

Gly Cys Phe Phe Pro Leu Thr Asp Asn Val Thr Pro Thr Lys His Ala  
35 40 45

Ile Val Gln Thr Leu Val His Leu Gln Asn Pro Lys Lys Ala Ser Lys  
50 55 60

Ala Cys Cys Val Pro Thr Lys Leu Asp Ala Ile Ser Ile Leu Tyr Lys  
65 70 75 80

Asp Asp Ala Gly Val Pro Thr Leu Ile Tyr Asn Tyr Glu Gly Met Lys  
85 90 95

Val Ala Glu Cys Gly Cys Arg  
100

<210> 55  
<211> 102  
<212> PRT  
<213> Homo sapiens

<220>  
<223> OP-1

<400> 55  
Cys Lys Lys His Glu Leu Tyr Val Ser Phe Arg Asp Leu Gly Trp Gln  
1 5 10 15

Asp Trp Ile Ile Ala Pro Glu Gly Tyr Ala Ala Tyr Tyr Cys Glu Gly  
20 25 30

Glu Cys Ala Phe Pro Leu Asn Ser Tyr Met Asn Ala Thr Asn His Ala  
35 40 45

Ile Val Gln Thr Leu Val His Phe Ile Asn Pro Glu Thr Val Pro Lys  
50 55 60  
Pro Cys Cys Ala Pro Thr Gln Leu Asn Ala Ile Ser Val Leu Tyr Phe  
65 70 75 80  
Asp Asp Ser Ser Asn Val Ile Leu Lys Lys Tyr Arg Asn Met Val Val  
85 90 95  
Arg Ala Cys Gly Cys His  
100

<210> 56  
<211> 102  
<212> PRT  
<213> Homo sapiens

<220>  
<223> OP-2

<400> 56  
Cys Arg Arg His Glu Leu Tyr Val Ser Phe Gln Asp Leu Gly Trp Leu  
1 5 10 15  
Asp Trp Val Ile Ala Pro Gln Gly Tyr Ser Ala Tyr Tyr Cys Glu Gly  
20 25 30  
Glu Cys Ser Phe Pro Leu Asp Ser Cys Met Asn Ala Thr Asn His Ala  
35 40 45  
Ile Leu Gln Ser Leu Val His Leu Met Lys Pro Asn Ala Val Pro Lys  
50 55 60  
Ala Cys Cys Ala Pro Thr Lys Leu Ser Ala Thr Ser Val Leu Tyr Tyr  
65 70 75 80  
Asp Ser Ser Asn Asn Val Ile Leu Arg Lys His Arg Asn Met Val Val  
85 90 95  
Lys Ala Cys Gly Cys His  
100

<210> 57  
<211> 102  
<212> PRT  
<213> Mus musculus

<220>  
<223> OP-3

<400> 57  
Cys Arg Arg His Glu Leu Tyr Val Ser Phe Arg Asp Leu Gly Trp Leu  
1 5 10 15  
Asp Ser Val Ile Ala Pro Gln Gly Tyr Ser Ala Tyr Tyr Cys Ala Gly



<400> 59

Cys His Arg His Gln Leu Phe Ile Asn Phe Gln Asp Leu Gly Trp His  
1 5 10 15

Lys Trp Val Ile Ala Pro Lys Gly Phe Met Ala Asn Tyr Cys His Gly  
20 25 30

Glu Cys Pro Phe Ser Met Thr Thr Tyr Leu Asn Ser Ser Asn Tyr Ala  
35 40 45

Phe Met Gln Ala Leu Met His Met Ala Asp Pro Lys Val Pro Lys Ala  
50 55 60

Val Cys Val Pro Thr Lys Leu Ser Pro Ile Ser Met Leu Tyr Gln Asp  
65 70 75 80

Ser Asp Lys Asn Val Ile Leu Arg His Tyr Glu Asp Met Val Val Asp  
85 90 95

Glu Cys Gly Cys Gly  
100

<210> 60

<211> 102

<212> PRT

<213> Mus musculus

<220>

<223> GDF-9

<400> 60

Cys Glu Leu His Asp Phe Arg Leu Ser Phe Ser Gln Leu Lys Trp Asp  
1 5 10 15

Asn Trp Ile Val Ala Pro His Arg Tyr Asn Pro Arg Tyr Cys Lys Gly  
20 25 30

Asp Cys Pro Arg Ala Val Arg His Arg Tyr Gly Ser Pro Val His Thr  
35 40 45

Met Val Gln Asn Ile Ile Tyr Glu Lys Leu Asp Pro Ser Val Pro Arg  
50 55 60

Pro Ser Cys Val Pro Gly Lys Tyr Ser Pro Leu Ser Val Leu Thr Ile  
65 70 75 80

Glu Pro Asp Gly Ser Ile Ala Tyr Lys Glu Tyr Glu Asp Met Ile Ala  
85 90 95

Thr Arg Cys Thr Cys Arg  
100

<210> 61

<211> 105

<212> PRT

<213> Homo sapiens

<220>

<223> INHIBIN-Alpha

<400> 61

Cys His Arg Val Ala Leu Asn Ile Ser Phe Gln Glu Leu Gly Trp Glu  
1 5 10 15  
Arg Trp Ile Val Tyr Pro Pro Ser Phe Ile Phe His Tyr Cys His Gly  
20 25 30  
Gly Cys Gly Leu His Ile Pro Pro Asn Leu Ser Leu Pro Val Pro Gly  
35 40 45  
Ala Pro Pro Thr Pro Ala Gln Pro Tyr Ser Leu Leu Pro Gly Ala Gln  
50 55 60  
Pro Cys Cys Ala Ala Leu Pro Gly Thr Met Arg Pro Leu His Val Arg  
65 70 75 80  
Thr Thr Ser Asp Gly Gly Tyr Ser Phe Lys Tyr Glu Thr Val Pro Asn  
85 90 95  
Leu Leu Thr Gln His Cys Ala Cys Ile  
100 105

<210> 62

<211> 106

<212> PRT

<213> Bos taurus

<220>

<223> INHIBIN-BetaA

<400> 62

Cys Cys Lys Lys Gln Phe Phe Val Ser Phe Lys Asp Ile Gly Trp Asn  
1 5 10 15  
Asp Trp Ile Ile Ala Pro Ser Gly Tyr His Ala Asn Tyr Cys Glu Gly  
20 25 30  
Glu Cys Pro Ser His Ile Ala Gly Thr Ser Gly Ser Ser Leu Ser Phe  
35 40 45  
His Ser Thr Val Ile Asn His Tyr Arg Met Arg Gly His Ser Pro Phe  
50 55 60  
Ala Asn Leu Lys Ser Cys Cys Val Pro Thr Lys Leu Arg Pro Met Ser  
65 70 75 80  
Met Leu Tyr Tyr Asp Asp Gly Gln Asn Ile Ile Lys Lys Asp Ile Gln  
85 90 95  
Asn Met Ile Val Glu Glu Cys Gly Cys Ser  
100 105

<210> 63  
 <211> 106  
 <212> PRT  
 <213> Homo sapiens

<220>  
 <223> INHIBIN-BetaB

<400> 63  
 Cys Cys Lys Lys Gln Phe Phe Val Ser Phe Lys Asp Ile Gly Trp Asn  
   1                  5                  10                  15  
 Asp Trp Ile Ile Ala Pro Ser Gly Tyr His Ala Asn Tyr Cys Glu Gly  
                   20                  25                  30  
 Glu Cys Pro Ser His Ile Ala Gly Thr Ser Gly Ser Ser Leu Ser Phe  
                   35                  40                  45  
 His Ser Thr Val Ile Asn His Tyr Arg Met Arg Gly His Ser Pro Phe  
                   50                  55                  60  
 Ala Asn Leu Lys Ser Cys Cys Val Pro Thr Lys Leu Arg Pro Met Ser  
   65                  70                  75                  80  
 Met Leu Tyr Tyr Asp Asp Gly Gln Asn Ile Ile Lys Lys Asp Ile Gln  
                   85                  90                  95  
 Asn Met Ile Val Glu Glu Cys Gly Cys Ser  
                   100                  105

<210> 64  
 <211> 98  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: TGF-B  
           SUBGROUP SEQUENCE PATTERN

<220>  
 <223> Each Xaa is independently selected from a group of  
       one or more specified amino acids as defined in  
       the specification

<400> 64  
 Cys Cys Val Arg Pro Leu Tyr Ile Asp Phe Arg Xaa Asp Leu Gly Trp  
   1                  5                  10                  15  
 Lys Trp Ile His Glu Pro Lys Gly Tyr Xaa Ala Asn Phe Cys Xaa Gly  
                   20                  25                  30  
 Xaa Cys Pro Tyr Xaa Trp Ser Xaa Asp Thr Gln Xaa Ser Xaa Val Leu  
                   35                  40                  45

Xaa Leu Tyr Asn Xaa Xaa Asn Pro Xaa Ala Ser Ala Xaa Pro Cys Cys  
     50                    55                    60  
 Val Pro Gln Xaa Leu Glu Pro Leu Xaa Ile Xaa Tyr Tyr Val Gly Arg  
     65                    70                    75                    80  
 Xaa Xaa Lys Val Glu Gln Leu Ser Asn Met Xaa Val Xaa Ser Cys Lys  
                     85                    90                    95  
 Cys Ser

<210> 65  
 <211> 104  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Each Xaa is independently selected from a group of  
         one or more specified amino acids as defined in  
         the specification

<220>  
 <223> Description of Artificial Sequence: VG/DPP  
         SUBGROUP SEQUENCE PATTERN

<400> 65  
 Cys Xaa Xaa Xaa Xaa Leu Tyr Val Xaa Phe Xaa Asp Xaa Gly Trp Xaa  
     1                    5                    10                    15  
 Asp Trp Ile Ile Ala Pro Xaa Gly Tyr Xaa Ala Xaa Tyr Cys Xaa Gly  
                     20                    25                    30  
 Xaa Cys Xaa Phe Pro Leu Xaa Xaa Xaa Xaa Asn Xaa Thr Asn His Ala  
                     35                    40                    45  
 Ile Xaa Gln Thr Leu Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro  
     50                    55                    60  
 Lys Xaa Cys Cys Xaa Pro Thr Xaa Leu Xaa Ala Xaa Ser Xaa Leu Tyr  
     65                    70                    75                    80  
 Xaa Asp Xaa Xaa Xaa Xaa Xaa Val Xaa Leu Xaa Xaa Tyr Xaa Xaa Met  
                     85                    90                    95  
 Xaa Val Xaa Xaa Cys Gly Cys Xaa  
     100

<210> 66  
 <211> 107  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: GDF SUBGROUP

# PATTERN

<220>

<223> Each Xaa is independently selected from a group of one or more specified amino acids as defined in the specification

<400> 66

Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe Xaa Xaa Xaa Xaa Trp Xaa  
1 5 10 15

Xaa Trp Xaa Xaa Ala Pro Xaa Xaa Xaa Xaa Xaa Xaa Xaa Cys Xaa Gly  
20 25 30

Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
50 55 60

Pro Xaa Xaa Xaa Xaa Xaa Xaa Cys Val Pro Xaa Xaa Xaa Ser Pro Xaa  
65 70 75 80

Ser Xaa Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr  
85 90 95

Glu Asp Met Xaa Xaa Xaa Xaa Cys Xaa Cys Xaa  
100 105

<210> 67

<211> 109

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: INHIBIN  
SUBGROUP PATTERN

<220>

<223> Each Xaa is independently selected from a group of one or more specified amino acids as defined in the specification

<400> 67

Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe Xaa Xaa Xaa Gly Trp Xaa  
1 5 10 15

Xaa Trp Ile Xaa Xaa Pro Xaa Xaa Xaa Xaa Xaa Xaa Tyr Cys Xaa Gly  
20 25 30

Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
50 55 60



Xaa Xaa Xaa Xaa Xaa Cys Cys Xaa Xaa Xaa Pro Xaa Xaa Xaa Xaa Xaa  
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
85 90 95

Xaa Xaa Xaa Asn Xaa Xaa Xaa Xaa Xaa Cys Xaa Cys Xaa  
100 105

<210> 68

<211> 139

<212> PRT

<213> Homo sapiens

<220>

<223> Mature H2223 mutant

<400> 68

Ser Thr Gly Ser Lys Gln Arg Ser Gln Asn Arg Ser Lys Thr Pro Lys  
1 5 10 15

Asn Gln Glu Ala Leu Arg Met Ala Asn Val Ala Glu Asn Ser Ser Ser  
20 25 30

Asp Gln Arg Gln Ala Cys Lys Lys His Glu Leu Tyr Val Ser Phe Arg  
35 40 45

Asp Leu Gly Trp Gln Asp Trp Ile Ile Ala Pro Glu Gly Tyr Ala Ala  
50 55 60

Tyr Tyr Cys Glu Gly Glu Cys Ala Phe Pro Leu Asn Ser Tyr Met Asn  
65 70 75 80

Ala Thr Asn His Ala Ile Val Gln Thr Leu Val His Phe Ile Asn Pro  
85 90 95

Glu Thr Val Pro Lys Pro Cys Cys Ala Pro Thr Gln Leu Asn Ala Ile  
100 105 110

Ser Val Leu Tyr Phe Asp Asp Ser Ser Asn Val Ile Leu Lys Lys Tyr  
115 120 125

Glu Asp Met Val Val Glu Ala Cys Gly Cys Arg  
130 135

<210> 69

<211> 117

<212> PRT

<213> Homo sapiens

<220>

<223> Trypsin truncated H2223 mutant

<400> 69

Met Ala Asn Val Ala Glu Asn Ser Ser Ser Asp Gln Arg Gln Ala Cys

1                      5                      10                      15  
 Lys Lys His Glu Leu Tyr Val Ser Phe Arg Asp Leu Gly Trp Gln Asp  
                     20                      25                      30  
 Trp Ile Ile Ala Pro Glu Gly Tyr Ala Ala Tyr Tyr Cys Glu Gly Glu  
                     35                      40                      45  
 Cys Ala Phe Pro Leu Asn Ser Tyr Met Asn Ala Thr Asn His Ala Ile  
                     50                      55                      60  
 Val Gln Thr Leu Val His Phe Ile Asn Pro Glu Thr Val Pro Lys Pro  
                     65                      70                      75                      80  
 Cys Cys Ala Pro Thr Gln Leu Asn Ala Ile Ser Val Leu Tyr Phe Asp  
                     85                      90                      95  
 Asp Ser Ser Asn Val Ile Leu Lys Lys Tyr Glu Asp Met Val Val Glu  
                     100                      105                      110  
 Ala Cys Gly Cys Arg  
                     115

<210> 70  
 <211> 33  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: Primer #1

<220>  
 <221> CDS  
 <222> (1)..(33)

<400> 70  
 gcg ccc acg cag ctc agc gct atc tcc gtc ctc  
 Ala Pro Thr Gln Leu Ser Ala Ile Ser Val Leu  
                     1                      5                      10

33

<210> 71  
 <211> 11  
 <212> PRT  
 <213> Artificial Sequence

<400> 71  
 Ala Pro Thr Gln Leu Ser Ala Ile Ser Val Leu  
                     1                      5                      10

<210> 72  
 <211> 43  
 <212> DNA  
 <213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Primer #2

<400> 72  
ctatctgcag ccacaagctt cgaccacat gtcttcgtat ttc 43

<210> 73  
<211> 43  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: complement of  
Primer #2

<220>  
<221> CDS  
<222> (2)..(43)

<400> 73  
g aaa tac gaa gac atg gtg gtc gaa gct tgt ggc tgc aga tag 43  
Lys Tyr Glu Asp Met Val Val Glu Ala Cys Gly Cys Arg  
1 5 10

<210> 74  
<211> 13  
<212> PRT  
<213> Artificial Sequence

<400> 74  
Lys Tyr Glu Asp Met Val Val Glu Ala Cys Gly Cys Arg  
1 5 10

<210> 75  
<211> 44  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: the sequence  
between the T7 promoter, at the XbaI site, and the  
ATG codon

<400> 75  
tctagaataa ttttgtttta cctttaagaa ggagatatac gatg 44

<210> 76  
<211> 19  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Primer #3

<400> 76  
taatacgact cactatagg 19

<210> 77  
<211> 18  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Primer #4

<400> 77  
gctgagctgc gtgggcgc 18

<210> 78  
<211> 18  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: complement of  
Primer #4

<220>  
<221> CDS  
<222> (1)..(18)

<400> 78  
gcg ccc acg cag ctc agc 18  
Ala Pro Thr Gln Leu Ser  
1 5

<210> 79  
<211> 6  
<212> PRT  
<213> Artificial Sequence

<400> 79  
Ala Pro Thr Gln Leu Ser  
1 5

<210> 80  
<211> 23  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Primer #5

<400> 80  
ggatcctatc tgcagccaca agc 23

<210> 81  
 <211> 23  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: complement of  
 Primer #5

<220>  
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 <222> (1)..(18)

<400> 81  
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 Ala Cys Gly Cys Arg  
 1 5

23

<210> 82  
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 <212> PRT  
 <213> Artificial Sequence

<400> 82  
 Ala Cys Gly Cys Arg  
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<210> 83  
 <211> 102  
 <212> PRT  
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<220>  
 <223> CDMP-1/GDF-5

<400> 83  
 Cys Ser Arg Lys Ala Leu His Val Asn Phe Lys Asp Met Gly Trp Asp  
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 Asp Trp Ile Ile Ala Pro Leu Glu Tyr Glu Ala Phe His Cys Glu Gly  
 20 25 30  
 Leu Cys Glu Phe Pro Leu Arg Ser His Leu Glu Pro Thr Asn His Ala  
 35 40 45  
 Val Ile Gln Thr Leu Met Asn Ser Met Asp Pro Glu Ser Thr Pro Pro  
 50 55 60  
 Thr Cys Cys Val Pro Thr Arg Leu Ser Pro Ile Ser Ile Leu Phe Ile  
 65 70 75 80  
 Asp Ser Ala Asn Asn Val Val Tyr Lys Gln Tyr Glu Asp Met Val Val  
 85 90 95

Glu Ser Cys Gly Cys Arg  
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<210> 84  
<211> 102  
<212> PRT  
<213> Homo sapiens

<220>  
<223> CDMP-2/GDF-6

<400> 84  
Cys Ser Lys Lys Pro Leu His Val Asn Phe Lys Glu Leu Gly Trp Asp  
1 5 10 15  
Asp Trp Ile Ile Ala Pro Leu Glu Tyr Glu Ala Tyr His Cys Glu Gly  
20 25 30  
Val Cys Asp Phe Pro Leu Arg Ser His Leu Glu Pro Thr Asn His Ala  
35 40 45  
Ile Ile Gln Thr Leu Met Asn Ser Met Asp Pro Gly Ser Thr Pro Pro  
50 55 60  
Ser Cys Cys Val Pro Thr Lys Leu Thr Pro Ile Ser Ile Leu Tyr Ile  
65 70 75 80  
Asp Ala Gly Asn Asn Val Val Tyr Lys Gln Tyr Glu Asp Met Val Val  
85 90 95  
Glu Ser Cys Gly Cys Arg  
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<210> 85  
<211> 102  
<212> PRT  
<213> Mus musculus

<220>  
<223> GDF-6

<400> 85  
Cys Ser Arg Lys Pro Leu His Val Asn Phe Lys Glu Leu Gly Trp Asp  
1 5 10 15  
Asp Trp Ile Ile Ala Pro Leu Glu Tyr Glu Ala Tyr His Cys Glu Gly  
20 25 30  
Val Cys Asp Phe Pro Leu Arg Ser His Leu Glu Pro Thr Asn His Ala  
35 40 45  
Ile Ile Gln Thr Leu Met Asn Ser Met Asp Pro Gly Ser Thr Pro Pro  
50 55 60  
Ser Cys Cys Val Pro Thr Lys Leu Thr Pro Ile Ser Ile Leu Tyr Ile

65                      70                      75                      80  
 Asp Ala Gly Asn Asn Val Val Tyr Lys Gln Tyr Glu Asp Met Val Val  
                             85                      90                      95

Glu Ser Cys Gly Cys Arg  
                             100

<210> 86  
 <211> 102  
 <212> PRT  
 <213> Bos taurus

<220>  
 <223> CDMP-2

<400> 86  
 Cys Ser Lys Lys Pro Leu His Val Asn Phe Lys Glu Leu Gly Trp Asp  
   1                            5                            10                            15

Asp Trp Ile Ile Ala Pro Leu Glu Tyr Glu Ala Tyr His Cys Glu Gly  
                             20                            25                            30

Val Cys Asp Phe Pro Leu Arg Ser His Leu Glu Pro Thr Asn His Ala  
                             35                            40                            45

Ile Ile Gln Thr Leu Met Asn Ser Met Asp Pro Gly Ser Thr Pro Pro  
   50                            55                            60

Ser Cys Cys Val Pro Thr Lys Leu Thr Pro Ile Ser Ile Leu Tyr Ile  
   65                            70                            75                            80

Asp Ala Gly Asn Asn Val Val Tyr Asn Glu Tyr Glu Glu Met Val Val  
                             85                            90                            95

Glu Ser Cys Gly Cys Arg  
                             100

<210> 87  
 <211> 102  
 <212> PRT  
 <213> Mus musculus

<220>  
 <223> GDF-7

<400> 87  
 Cys Ser Arg Lys Ser Leu His Val Asp Phe Lys Glu Leu Gly Trp Asp  
   1                            5                            10                            15

Asp Trp Ile Ile Ala Pro Leu Asp Tyr Glu Ala Tyr His Cys Glu Gly  
                             20                            25                            30

Val Cys Asp Phe Pro Leu Arg Ser His Leu Glu Pro Thr Asn His Ala  
                             35                            40                            45

Ile Ile Gln Thr Leu Leu Asn Ser Met Ala Pro Asp Ala Ala Pro Ala  
50 55 60

Ser Cys Cys Val Pro Ala Arg Leu Ser Pro Ile Ser Ile Leu Tyr Ile  
65 70 75 80

Asp Ala Ala Asn Asn Val Val Tyr Lys Gln Tyr Glu Asp Met Val Val  
85 90 95

Glu Ala Cys Gly Cys Arg  
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<210> 88  
<211> 102  
<212> PRT  
<213> Homo sapiens

<220>  
<223> CDMP-3 construct

<400> 88  
Cys Ser Arg Lys Pro Leu His Val Asp Phe Lys Glu Leu Gly Trp Asp  
1 5 10 15

Asp Trp Ile Ile Ala Pro Leu Asp Tyr Glu Ala Tyr His Cys Glu Gly  
20 25 30

Leu Cys Asp Phe Pro Leu Arg Ser His Leu Glu Pro Thr Asn His Ala  
35 40 45

Ile Ile Gln Thr Leu Leu Asn Ser Met Ala Pro Asp Ala Ala Pro Ala  
50 55 60

Ser Cys Cys Val Pro Ala Arg Leu Ser Pro Ile Ser Ile Leu Tyr Ile  
65 70 75 80

Asp Ala Ala Asn Asn Val Val Tyr Lys Gln Tyr Glu Asp Met Val Val  
85 90 95

Glu Ala Cys Gly Cys Arg  
100